REMARKS

This Amendment Accompanying a Request for Continued Examination is in response to the Office action mailed May 17, 2007, which was made final. A petition for two-month extension of time, with the requisite fee, and a notice of appeal and fee, were submitted on October 17, 2007. A Request for Continued Examination (with the requisite fee) is submitted herewith, and it is therefore respectfully requested that prosecution on the merits for the instant application be re-opened, rather than proceeding at this time with an appeal.

Claims 9, 23-25, 31 and 34-37 were presented for examination and Claims 9, 23-25 and 31 were rejected. Allowance of Claims 36 and 37 is noted with appreciation. New independent claim 38 is added by way of the present amendment in an effort to more completely define the present invention. However, it is believed that no additional independent claim fees or excess claim fees are necessary, as adequate independent claim fees have already been submitted in this application. In the event any additional fees are necessary, kindly charge the cost thereof to our Deposit Account No. 13-2855.

35 U.S.C. § 112 Rejections

Claims 9, 34 and 35 were rejected under 35 U.S.C. § 112, second paragraph. In response, claim 9 has been amended in the light of the 35 U.S.C. § 112 rejection to remove reference to the term "planar" and substitute "beam." Withdrawal of these rejections is respectfully requested.

35 U.S.C. § 103 Rejections

Claims 9, 23-24 and 31 were under 35 U.S.C. § 103(a) as allegedly being unpatentable over Nishikawa et al., U.S. Patent No. 5,263,250, in view of Shei et al., U.S. Patent No. 5,569,238. In some instances, the rejections are based on Nishikawa et al. in view of Shei et al., and further in view of GB 2 262 253 A (Turner) alone or in combination with Hinzy, U.S. Patent No. 5,048,938, or alternately, the rejections are based on Nishikawa et al. in view of Shei et al., and further in view of purportedly Admitted Prior Art.

Applicants respectfully submit that it would not have been obvious to a person of ordinary skill in the art at the time of the invention to combine the teachings of these

references, for the reasons previously argued and additionally for the reasons set forth below.

It is submitted that:

- the combination of two methods of beam homogenization required by the claim produces a benefit that could not be foreseen from the disclosure of the prior art made of record;
- the person of ordinary skill in the art would regard the methods of beam homogenization taught respectively by Nishikwa and Shei as alternative solutions to the same problem of lack of uniformity of the beam; and
- the allegedly obvious use, together, of two methods having apparently the same function, would in fact be dismissed by the person of ordinary skill in the art as redundant and wastefully inefficient.

The language of Claim 9 firstly requires 'splitting said beam into a number of sub-beams, each sub-beam having divergence, the origin of divergence of each sub-beam lying apart from the point at which the respective sub-beam is created by splitting', this being accomplished in one disclosed example by the use of a fly's-eye lens.

The Nishiwaki et al. reference discloses as its object the efficient use of beam energy in forming ink-jet nozzles (see column 1, lines 23-26 to this effect). It achieves this goal by splitting a beam into sub-beams through the use of a plurality of prisms (61a-6ma and 61b-6mb, displayed in Fig. 8) and focusing all the sub-beams on a single mask (8, displayed in Fig. 5). In this way, spatial inhomogeneities in the original beam will be reduced as several samples of beam intensity – the sub-beams – are combined and 'the light transmissible portion 8a can be irradiated at the same illumination intensity' (column 5, lines 21-23). The fly's-eye lens is specifically disclosed as 'an optical integrator'; one of ordinary skill in the art would thus see the fly's-eye lens as a means to provide uniform illumination of the front surface of the mask.

Claim 9 secondly requires that the beam is passed through a rotating assembly comprising three fixed reflective surfaces.

The Shei et al. reference utilizes three rotating reflective surfaces as a beam homogenizer, but to any extent that the teaching of the two references might be considered together (in a manner proposed in the Office action and traversed by Applicants on the grounds set forth previously), one of ordinary skill in the art would see the beam homogenizer of the Shei et al. reference as a functional equivalent to the optical integrator disclosed in the Nishiwaki et al. reference. Therefore, he would view these two methods as interchangeable means of uniformly-illuminating the front surface of the work piece. The notion of using both methods would – it is submitted – be dismissed as redundant and wastefully inefficient.

The Applicants have recognized that in the specific problem of forming an ink jet printing nozzle with a nozzle inlet larger in diameter than a nozzle outlet, there is an unexpected benefit – not predictable from either the Nishiwaki et al. or Shei et al. references – in a single arrangement having *both* methods of beam homogenizing.

Thus, in the example described with reference to Figure 1 of the instant application, the fly's-eye lens (40) acts to sample the beam over several areas of the beam's cross-section, splitting the single beam into several sub-beams. These sub-beams are focused so that they form an image at the plane of the mask (70), the shape of the image determined by the shape of the individual lenses (45) in the fly's-eye lens; the sub-beams pass through the mask and are focused to form and image on the front face of the nozzle plate (22). The mask acts to reshape the sub-beams so that the shape of the image formed on the front face of the nozzle plate (22) is a resized version of the mask aperture (72).

As the sub-beams are in focus at the front face of the nozzle plate (22), the images formed by all sub-beams overlap fully and illuminate the same area of the front-face (22). Thus, the intensities of all areas of the original beam are combined over this area so that any spatial discontinuities are averaged out.

However, at the rear face of the nozzle plate (22) the sub-beams are no longer in focus and thus illuminate areas that overlap only partially. The rotating beam assembly acts to homogenize the illumination provided at the rear face, thus providing a highly uniform three-dimensional nozzle structure.

The benefit provided by the combination of the fly's-eye lens and the rotating assembly is only felt as a three-dimensional structure is formed and where the intensity profile with depth into the work piece is of concern. The Nishikawa et al. reference does not voice such a concern over the lack of homogeneity with depth and therefore, there remains no motivation to combine the teaching of that document with the apparently equivalent teaching of the Shei et al. reference, nor any reason why a person of ordinary skill in the art would have, without the benefit of hindsight, been able to apply common sense to reach the Applicants' solution.

Further, the Shei et al. reference is clearly concerned with homogenizing only the two-dimensional intensity profile of a beam, since only the illumination of the front face of the structure (in this case the human eye) is of concern. Indeed, the Shei et al. reference teaches that the beam which is applied to the eye is preferably parallel (column 8, lines 18-19) thus there could not be any variation with depth of intensity. Hence, the disclosure of Shei et al. is not reasonably pertinent to the Applicants' field of endeavor – reducing variations in intensity with depth.

Moreover, neither the Nishikawa et al. nor Shei et al. reference teaches the synergistic effect of the claimed combination of two methods of homogenizing a beam.

For at least these reasons, allowance of Claims 9, 23 and 31 and claims dependent thereupon is respectfully solicited.

With regard to Turner, GB 2 262 253 A, the Office action appears to suggest that the beam homogenizer of the Shei et al. reference might be combined with the method of Turner to provide a tapered nozzle. It is respectfully submitted that the use of the method of Turner with the rotating beam assembly of Shei et al. would be contrary to the clear and consistent teaching of Shei et al.

The Shei et al. reference uses the rotation of the three reflecting surfaces of the beam homogenizer to create a beam 'which is symmetric with respect to the optical axis of the laser beam 110' (column 4, lines 55-56). Turner utilizes a rotating optical assembly 8, which rotates about the polar axis of the fixed spherical lens 10 and thus the

beam also rotates about this axis 17. In contrast to the homogenizing effect of rotation in Shei et al., in Turner, "rotation of the beam on this lens results in a continuous directional change of the beam energy through the material". Thus the output of Turner is clearly not 'symmetric with respect to the optical axis of the laser beam' and therefore the combination of the teaching of Turner would contradict the clear and consistent teaching of Shei et al.

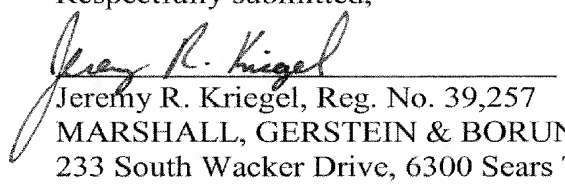
It is further submitted that the prior art made of record does not disclose a motivation for providing a reverse-tapered nozzle for an inkjet printer, and there is no reason why, without the aid of impermissible hindsight, a person of ordinary skill in the art at the time of Applicants' invention would have been able to apply common sense to reach the Applicants' solution. While Turner arguably provides motivation for providing such with an aircraft wing, but it is clear that this is an entirely different technical field with different technical considerations. The Office action suggests the motivation would be to ensure the nozzle inlet matches the shape of the channel, but this is not a motivation disclosed in the prior art made of record. The Office action also suggests the motivation would be to allow a more flexible process; such an argument is respectfully submitted as without force, as the inclusion of any feature could be seen to add flexibility, even where there is no requirement or need for them within the Applicants' field of endeavor.

With respect to the Hinzy reference and purported APA, it is respectfully submitted that the proposed modification of Nishiwaki et al. in view of Shei et al. is contrary to the teachings of those references, a situation remedied by neither of these additional references. Withdrawal of these rejections is therefore respectfully solicited.

In view of the foregoing, it is respectfully submitted that all claims of the present application are in condition for allowance. The Examiner's reconsideration and favorable action are respectfully solicited.

Date: October 30, 2007

Respectfully submitted,



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